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A PRELIMINARY ACCOUNT OF THE DORIDIDÆ OF  
MONTEREY BAY, CALIFORNIA.

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By permission of Hon. George M. Bowers, U. S. Commissioner of Fish and Fisheries.

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For a number of years past the writer has been engaged upon a study of the Opisthobranch Mollusca of Monterey Bay and the adjacent sea coast, the results of which will soon appear in a series of systematic and morphological papers upon the families represented, fully illustrated by colored plates and drawings. The present article is intended to serve merely as a preliminary list of the species of the Dorididæ found, with sufficient data to render their recognition easy by other students of the group. While occupying the Smithsonian table at the Naples Zoological Station during the months from November to April, 1902-03, I enjoyed the opportunity of studying a large number of Mediterranean Dorididæ for purposes of comparison with Pacific forms. My sincere acknowledgments are due to Professors Dohrn, Eisig and Mayer, and to Dr. Lo Bianco and to their able assistants for the many kindnesses shown to me while there. To the directors of the Hopkins Seaside Laboratory, Pacific Grove, California, Professors Jenkins and Gilbert, I would express my gratitude for the facilities afforded me and for the unflinching kindly interest which they have shown in my work.

The collections upon which the present paper is based have

been made at various times during the year for several years. The most of them have been secured by shore collecting, the littoral fauna being exceptionally rich and the area exposed at low tide being large. Some have been taken by dredging, but extended systematic work by this means has not yet been carried out. The material secured by the dredging operations of the U. S. Bureau of Fisheries steamer *Albatross* during the spring of 1904 will be reported upon in another place.

With the exception of the early and fragmentary papers of Cooper and Stearns and the later ones of Bergh upon Alaskan Nudibranchs, the Californian Opisthobranchs are practically unknown. To this fact is due the large number of new species listed. In no group is the necessity for full and careful anatomical study more necessary as a basis for specific description than in the Opisthobranchiata. In many cases even the genus to which a specimen belongs can not be made out by general external characters alone. The practice of basing new species upon such superficial and variable characteristics as form, color and size alone can not be too strongly condemned. In every case here listed, with one exception, a careful morphological study has been made, in many instances aided by serial sections, and the complete descriptions will be fully illustrated by plates in the final papers. The general systematic arrangement as proposed by Bergh (1892) has been followed.

The following is a list of the Dorididæ thus far taken :

#### NUDIBRANCHIATA HOLOHEPATICA.

##### I. Dorididæ cryptobranchiatæ.

1. *Archidoris montereyensis* (Cooper).
2. *Montereina nobilis* gen. et sp. nov.
3. *Discodoris heathi* sp. nov.
4. *Rostanga pulchra* sp. nov.
5. *Diaulula sandiegensis* (Cooper).
6. *Aldisa sanguinea* (Cooper).
7. *Cadlina marginata* sp. nov.
8. *Cadlina flavomaculata* sp. nov.
9. *Chromodoris porteræ* Cockerell.
10. *Doriopsis fulva* sp. nov.

## II. Dorididæ Phanerobranchiatæ.

## A—Polyceridæ.

11. *Aegires albopunctatus* sp. nov.
12. *Laila cockerelli* gen. et sp. nov.
13. *Triopha carpenteri* (Stearns).
14. *Triopha maculata* sp. nov.
15. *Triopha grandis* sp. nov.
16. *Polycera atra* sp. nov.

## B—Goniodorididæ.

17. *Acanthodoris hudsoni* sp. nov.
18. *Acanthodoris brunnea* sp. nov.
19. *Ancula pacifica* sp. nov.
20. *Hopkinsia rosacea* gen. et sp. nov.

The types of the above new species have been deposited in the U. S. National Museum. Co-types will be placed in the Museum of the Leland Stanford Jr. University and in the Museum of the Philadelphia Academy of Sciences.

1. *Archidoris montereyensis* (Cooper).

*Doris montereyensis* Cooper. New Species of California Mollusca. Proc. Calif. Acad. Sci., II, 1862, 204.

*Doris montereyensis* Cooper. On New or Rare Mollusca Inhabiting the Coast of California. Proc. Calif. Acad. Sci., III, 1863, 58.

*Archidoris montereyensis* (Cooper). Bergh, Malacologische Untersuchungen (Semper, Reisen im Archipel der Philippinen. II, Heft XIV, 1878, 624.

*Archidoris montereyensis* (Cooper). Bergh, On the Nudibranchiate Gasteropod Mollusca of the North Pacific Ocean, with Special Reference to those of Alaska. I, Proc. Acad. Nat. Sci. Phila., 1879, 107.

Body elongate elliptical, the ends nearly equally rounded, dorsum slightly arched; mouth everywhere closely set with low conical tubercles, ground-color light yellow, having a dusty appearance due to extremely minute brown, greenish-brown or black dots thickly sprinkled over the dorsum everywhere; larger patches of same color scattered over dorsum upon as well as between the tubercles and more sparingly over the branchiæ.

Length up to 50 mm.; width up to 25 mm.; height up to 12 mm.

Foot elongate, elliptical, light yellow, the anterior margin bilabiate with no median notch; head small; tentacles auriculate with an external groove; rhinophores stout, retractile into conspicuous sheaths with tuberculate margins, perfoliate with 24 to 30 leaves on each side. Branchial

plumes 7, 3 or 4 pinnate, retractile within tuberculate sheath; radula colorless, broad and short, deeply grooved, the teeth in 33 rows; rachis narrow, naked; pleuræ multidentate with 42 to 49 strongly hooked compressed teeth, each bearing a strong, wing-like expansion on the inner margin of the shaft. Glans penis unarmed, with no trace of a prostate gland upon the long (28 to 30 mm.) vas deferens.

This Californian species is clearly distinct from the European *A. tuberculata* (Cuvier).

Cooper (1862) described this species superficially from 2 specimens taken in dredging at Monterey Bay, in 6 to 10 fathoms depth. Bergh (1878-79) was able to add to this a description of the radula and body measurements from 4 dried specimens from Alaska and assigned the species to his genus *Archidoris*. Further than this nothing has been published upon this species. It is quite abundant at Monterey upon the piles of the wharf at all times of the year and in rocky tide pools.

U. S. National Museum, No. 181,285. Monterey Bay, Calif.

### Montereina gen. nov.

Body firm, dorsum tuberculate; tentacles long, conical; branchiæ large, tri- or quadripinnate in few divisions; large prostate gland present; vagina and glans penis unarmed.

This new genus is proposed for the reception of the following type species:

#### 2. *Montereina nobilis* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,284, U. S. National Museum.

Body very large, plump, arched, but little depressed; broad, elongate elliptical in outline, the ends nearly equally rounded; general ground-color a rich orange-yellow varying to light yellow in some specimens; dorsum thickly tuberculate, the tubercles slightly inflated at their distal ends; dorsum mottled everywhere between the tubercles with irregular blotches of dark brown or black, the total amount of dark coloration varying between wide limits in different individuals. Branchial plumes pinkish, tipped with white.

Length up to 20 cm.; width to 6 cm.; height to 3 cm.

Foot broad, smooth, light yellow, abruptly rounded in front, more gradually so behind, its anterior margin bilabiate, the upper lip with a slight median notch; mouth relatively small, lips fleshy, the oral tentacles digitiform or bluntly conical, directed forward, the tips curved outward; rhinophores stout, the stalk conical, the clavus perfoliate with about 24 leaves; the rhinophore sheath with tuberculate margin; branchial plumes 6, large, spreading, tri- and quadripinnate, covering the whole of the posterior dorsum. Radula broad and short, deeply grooved, colorless or nearly so, the rachis very narrow, naked; teeth in 26 rows of 55 to 62 teeth on each side;

pleuræ large strongly hooked, the wing much less strongly developed than in *Archidoris montereyensis*. Vas deferens long, slender, arising at its proximal end from the large ovoid whitish-yellow prostate gland which lies upon the upper anterior face of the anterior genital mass; glans penis unarmed; vagina unarmed.

Found in rocky tide-pools all along the coast of Monterey Bay at all seasons of the year but most abundant in the summer. Usually abundant on the piles of the Monterey wharf in company with the preceding smaller species, *Archidoris montereyensis*, from which it may be readily distinguished by the dark blotches of color of the dorsum being distributed between the tubercles and not upon them, and by the conical oral tentacles, as well as by its much larger size. The largest and most conspicuous Dorid of Monterey Bay.

### 3. *Discodoris heathi* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,282, U. S. National Museum.

Body elliptical, broad, depressed, dorsum minutely tuberculate, nearly smooth. General color light yellow, becoming darker toward the median line, the dorsum sprinkled everywhere with extremely minute black or brown spots, giving the animal a general dusty appearance; a variable number of black, brown or brownish-red flecks irregularly scattered over the dorsum, the majority of them in the mid-dorsal region; mantle margin thin, wide, crenulate, extending far beyond the foot except behind; foot rather narrow, its anterior end abruptly rounded, bilabiate; upper lip deeply notched.

The head is small and inconspicuous, being almost concealed between the mantle and foot, oral tentacles long, cylindro-conical; rhinophores moderately large, clavus perfoliate with 10 to 15 leaves, the whole organ retractile into a low sheath with slightly sinuous margin. Color of the rhinophores slightly darker than the mantle, thickly sprinkled with minute dark spots.

Branchial plumes 8 to 10, tripinnate, small, spreading, whitish yellow, sprinkled with minute black spots.

Total length of animal up to 30 mm.; width, up to 15 mm.; height, to 6 mm.

Labial disc elliptical, convex, the labial armature of short, closely set rods about  $42 \mu$  long by  $3.5 \mu$  in diameter arranged in two yellowish lateral lamellæ nearly quadrangular in form on the upper half of the tube; radula colorless, twice as long as broad, not deeply grooved, the teeth in 20 rows of 36 to 42 teeth in each half row; rhachis naked, pleuræ strongly hooked, the innermost 20 to 25 in each row nearly equal in size, the hook slightly increasing in length, the shaft obliquely curved toward the median line and bearing a thin wing-like expansion on the inner side. The outermost 12 to 16 pleuræ decrease very rapidly in size, fit closely together and become reduced to thin concave plates.

Glans penis bluntly conical, short, unarmed; the vas deferens very long and narrow passing into the thick prostate gland; vagina unarmed; vestibular gland present.

Found in rocky tide-pools, rather rarely. Species named in recognition of the willing cooperation of my colleague Dr. Harold Heath in collecting Pacific Coast Nudibranchs.

#### 4. *Rostanga pulchra* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,292, U. S. National Museum.

Body elliptical, depressed, the sides nearly parallel, the ends of the body equally rounded, the mantle ample, concealing the whole body except the tip of the tail. General ground-color bright red, varying from light yellowish red to deep scarlet, the back sprinkled everywhere with minute brown and black spots between the papillæ; the number of these spots highly variable, in some cases being few, in others many and thickly set and often grouped into small patches thus deepening the general color of the animal to a reddish brown.

Dimensions of largest individual taken: length, 18 mm.; width, 10 mm.; height, 5.5 mm.; the average size usually found, however, is from 8 to 12 mm. in length.

Dorsum covered everywhere with small closely set hispid papillæ strengthened by divergent spicules extending from base to apex, the central portion of the apical end being sunken and surrounded by a higher margin, elevated at intervals by the spicules into pointed projections. Sides of foot nearly parallel, abruptly rounded in front, more tapering behind; anterior margin deeply bilabiate, the upper more prominent lip with a median notch; oral tentacles long, slender, tapering. General color of the ventral surface of the foot, mantle, and sides of body a lighter red than dorsum, rarely with fine black sprinklings. Rhinophores short, stout, the stalk stout, conical, prolonged above the clavus as a blunt cylindrical process, nearly one-fourth length of whole organ; clavus perfoliate bearing from 20 to 24 nearly vertical triangular leaves (10 to 12) on either side, the leaves increasing regularly in size from before backward; sheath of the rhinophore low, papillate similarly to the general dorsum; branchial plumes 10 to 12 erect, separate, completely retractile into a common cavity the margin of which is similar to that of the rhinophore. Labial armature a crescentic band of flattened hooks upon the upper half of each side of the opening, the concave border directed forward, the upper point much in advance of the lower; elements of the armature in 5 closely overlapping rows, the tips of the anterior row blunted, those of the posterior rows smaller and pointed; radula broad, colorless, the median groove deep; teeth in 65 to 80 rows, with 81 teeth in each row; rhachis naked; first pleural tooth thick and stout, the base short and broad, the hook blunt, heavy, slightly curved and bearing 8 to 11 small denticles upon its inner margin; the succeeding 10 pleural teeth with large, broad base bearing a wing-like expansion upon outer border overlapping adjacent

tooth ; the hook at first strongly curved and thick but increasing in length, becoming less curved from the 12th tooth outwards, the base decreasing in bulk, passing over rapidly into very long slightly curved slender elements arising from small compressed bases and bearing from 1 to 6 very long denticles upon the inner margin in the distal third of the tooth, these denticles reaching nearly to tip of tooth and giving it the appearance of being divided ; outer teeth of whole radula very flexible and slender, presenting a brush-like appearance.

Glans penis unarmed, the vas deferens short, the prostate gland large thin-walled ; spermatheca spherical, very large, making up nearly two-thirds the bulk of the anterior genital mass.

Abundant everywhere along the coast in the rocky tide-pools from Monterey to Point Lobos upon a red silicious sponge which incrusts the under side of overhanging rocks and with which it is nearly identical in color.

##### 5. *Diaulula sandiegensis* (Cooper).

*Doris* (*Actinocyclus*?) *Sandiegensis* Cooper. New Species of Californian Mollusca. Proc. Calif. Acad. Sci., II, 1862, 204.

*Doris Sandiegensis* Cooper. New or Rare Mollusca Inhabiting the Coast of California, No. II, Proc. Calif. Acad. Sci., III, 1863, 58.

*Diaulula Sandiegensis* (Cooper). Bergh, The Nudibranchiate Gasteropod Mollusca of the North Pacific Ocean, with Special Reference to those of Alaska, II, Proc. Acad. Nat. Sci. Phila., 1880, 41.

Body soft, elliptical, velvety, the ends equally rounded, somewhat depressed ; mantle extending well beyond (6 to 8 mm.) the foot everywhere except at tip of tail ; mantle edge wide and thick, slightly crenulate ; dorsum everywhere minutely villous and velvety, pale yellowish in color with dark brown or black rings of varying size, number and position. In general these are arranged in 2 longitudinal series on each side of the median line with from 3 to 6 rings in each row but this is subject to much variation. Small patches of brown may also occur among the rings. The general color of the dorsum may vary from a light yellow to deep brownish yellow or even chocolate.

Oral tentacles long, slender, finger-like ; anterior end of foot deeply bilabiate, the upper thinner lip with a median notch ; rhinophores conical, the clavus dilated, perfoliate with 20 to 30 leaves, deeply retractile into sheaths with crenulate margin ; branchial plumes 6, tripinnate, retractile into sheath with prominent crenulate margin ; no labial armature save a simple cuticula ; radula rather broad, twice as long as wide, yellowish, the teeth in 19 to 22 rows, with 26 to 30 teeth in each half row ; rhachis broad, naked ; pleural teeth similar in shape, strongly hooked, compressed, a narrow wing-like expansion upon the inner side of each tooth. Glans penis unarmed ; prostate gland large.

Found in fucoid zone among rocks all along the southern coast of

Monterey Bay; not abundant but has been taken at all times of the year. This species was discovered and described superficially by Cooper (1862) and was afterwards studied anatomically by Bergh (1880) upon specimens from Alaska which appear to be identical with the Monterey form.

No. 181,288, U. S. National Museum. From Monterey Bay, Calif.

#### 6. *Aldisa sanguinea* (Cooper).

*Doris* (*Asteronotus*) *sanguinea* Cooper, New Species of Californian Mollusca. Proc. Calif. Ac. Sci., II, 1862, 204.

*Doris sanguinea* Cooper (*Asteronotus*), New or Rare Mollusca Inhabiting the Coast of California, No. II, *ibid.*, III, 1863, 58.

*Asteronotus?* *sanguineus* (Cooper). Bergh, Malacologische Untersuchungen (Semper, Reisen im Archipel der Philippinen), II, XVII, 1890, 917.

Body somewhat depressed, oval, the ends about equally rounded; dorsum covered everywhere with small conical tubercles, the general body-color light to dark red, sprinkled everywhere with minute black spots; on the median line immediately in front of the branchiæ a large rounded or oval black spot, another similar spot in advance of the first just behind the rhinophores. Foot abruptly rounded in front, less so behind, the sides converging posteriorly, anterior margin bilabiate.

Total length, up to 17 mm.; width, to 8 mm.; height, to 6 mm.

Tentacles short, auriform, grooved externally; rhinophores rather stout, the clavus conical, perfoliate with 12 to 15 leaves, deeply retractile into sheaths with low tuberculate margins; branchial plumes 8 to 10, simply pinnate or irregularly bipinnate, arranged in a circle, completely retractile into sheath with low tuberculate margin; oral cuticula thick; on the sides of the tube a delicate armature of extremely fine short rodlets; radula rather wide, teeth in 70 rows; rachis narrow, naked; pleural teeth very numerous and slender, at least 70 to 100 in each half row; each tooth made up of a triangular compressed base from which arises a slender rod-like shaft, the distal end slightly enlarged and hollowed on posterior face, on its thickened external and distal margin a single series of very small denticulations which continue down the border of the shaft for varying distances, in some cases occupying the distal half of the shaft; inner teeth about .5 mm. in length, the outermost ranging down to .03 mm.

Glans penis cylindrical, blunt, its cuticle with 5 or 6 rows of small recurved hooks.

This species was first described by Cooper (1862-63) as *Doris sanguinea* in an exceedingly fragmentary manner. The form is abundant in Monterey Bay and a careful study shows that it does not belong to the genus *Asteronotus* as given by Bergh (1892) but forms the second species of the genus *Aldisa*, the other species of which, *Aldisa zettlandica* Alder and Hancock, belongs to European waters.

No. 181,277, U. S. National Museum. Monterey Bay, Calif.



**7. *Cadlina marginata* sp. nov.**

*Type* from Monterey Bay, Calif. No. 181,287, U. S. National Museum.

Body elongate, elliptical, somewhat depressed; dorsum firm, covered everywhere with low tubercles; general ground-color yellowish white, the tubercles tipped with lemon yellow surrounded by a narrow ring of white forming the center of small polygonal areas into which the dorsum is divided; mantle margin and lateral and posterior edges of foot edged with a narrow band of lemon-yellow, tips of rhinophores, branchiæ and their sheaths of the same color.

Mantle margin wide, broadly overlapping the foot; foot narrow, nearly linear, its anterior end bilabiate, the upper lip notched, thin, the lower one thick; oral tentacles short, triangular, flattened, auriform with distinct external groove; rhinophores perfoliate with 16 to 18 leaves, margin of sheath bearing low tubercles tipped with yellow; branchial plumes 6, bipinnate, the sheath tuberculate.

Dimensions of large individual: length, 45 mm.; width, 22 mm.; height, 8 to 10 mm.

Labial armature a broad yellow band of bifid hooks, quadrangular below, narrowing laterally and interrupted above; radula broad with shallow median groove; teeth in 90 rows; dental formula 47-1-47; rhachis of radula with a single series of median teeth, erect, hooked, the tips divided into 4 to 6 nearly equal small blunt denticles; pleuræ 47, the innermost one strongly hooked with 3 large denticles on its inner and 6 or 7 smaller ones on its outer margin; the remaining pleuræ of much the same shape, the tip becoming longer and more pointed, the denticles limited to the outer margin alone and increasing in number to 12; the outermost pleuræ diminishing in size, being finally reduced to compressed jagged slightly concave plates.

Glans penis short, bluntly conical, armed with hooks.

Found in rocky tide-pools of the fucoid zone all along the southern coast of Monterey Bay. Not rare.

**8. *Cadlina flavomaculata* sp. nov.**

*Type* from Monterey Bay, Calif. No. 181,279, U. S. National Museum.

Body elongate, elliptical, almost linear, depressed, bluntly rounded at the ends, less so behind than in front; dorsum thickly set everywhere with low rounded tubercles. General color yellowish white; on each side of dorsum a row of 7 to 10 small lemon yellow spots borne upon low tubercles, the first one of these spots just outside of and behind the rhinophores, the last one outside of and usually behind the branchial plumes; rhinophores black, brown or brownish-yellow, very conspicuous against the pale dorsum; mantle margin thin, broadly overlapping the foot except behind; foot linear, bluntly pointed behind, in front abruptly rounded, bilabiate, lower lip fleshy, thick, the upper one thinner; tentacles short, flattened, bluntly auriform, the external margin grooved; rhinophores

rather large, erect, diverging, perfoliate with 10 to 12 leaves, clavus long, sheath margins thin and slightly tuberculate; branchial plumes small, 10 or 11, usually simply pinnate, occasionally bipinnate in part, completely retractile within a sheath with thin edges.

Length of large specimens, 20 mm.; width, 8 to 10 mm.; height, 4 mm.

Labial armature a broad light-yellow band, quadrangular below, triangular at the sides and interrupted above, its elements closely set hooks bifid at the distal end; radula small, broad with a very shallow median groove. Teeth in 77 rows; dental formula 23-1-23; rhachidian tooth massive, the hook divided into 4 to 6 long nearly equal denticles; pleuræ 23 in number, the first with a stout hook bearing 2 or 3 denticles on its inner margin and 4 to 7 smaller ones on the outer; the successive lateral teeth increasing somewhat in height and in number of denticles upon outer margin up to 12 to 15, the inner margin having none; toward the middle of the row the denticles become longer and more prominent, the whole tooth becoming sawlike in form; the outer 3 or 4 decrease somewhat in size but not so much as in the preceding species. Glans penis short, bluntly conical, and armed with minute recurved hooks; vas deferens very long of 2 portions, a proximal glandular and a distal muscular part indistinctly set off from each other.

Not rare. Found in the same localities as the preceding species. Very sluggish in movement in the aquarium. But one other species of this genus, *Cudlinu pacifica* Bergh, has been described from the Pacific (Alaska). It is clearly distinct from the Monterey forms as shown by the dentition, *C. pacifica* having 67 to 85 rows of teeth with a formula of 33-1-33, the rhachidian tooth having 3 or 4 denticles on *each side* of a median hook and the denticles of the outer pleuræ ranging up to 18 to 22, the first pleura having 3 upon the inner margin and 6 or 7 on the outer.

### 9. *Chromodoris porterae* Cockerell.

*Chromodoris porterae* Cockerell. Three New Species of Chromodoris, The Nautilus XVI, 1902, 20.

One specimen of *Chromodoris* was taken at Pacific Grove in 1894. Colored drawings were made of it but it escaped down the overflow pipe of the aquarium and was lost before further study could be made. The same species has been taken at La Jolla, California, and its color characteristics given under the above name by Prof. T. D. A. Cockerell (1902).

Body elongate, linear, depressed, mantle about equally rounded in front and behind, mantle margin rather narrow laterally and behind, in front broad; tail not covered by the mantle save in its anterior portion. General body-color deep ultramarine blue; mantle with 2 broad longitudinal stripes of orange, entirely or incompletely united behind the branchial plume, ending in front just outside the bases of the rhinophores; in front of rhinophores a transverse arc of orange as if a continuation of the lateral stripe; a median light blue line extending from between the rhinophores to the

branchiæ; margin of mantle narrowly edged with white; foot of same ultramarine blue as rest of body with a suffused median stripe of lighter blue upon dorsal surface of tail. Rhinophores perfoliate with 12 to 14 leaves, clavus slightly darker blue than the body of the animal, retractile within low sheaths with smooth margins. Branchiæ 9 to 11, simply pinnate, slightly lighter in color than the mantle, completely retractile within low sheaths with smooth margins.

Length, 22 mm. Radula? Reproductive system?

The above external characters are taken from my notes of 1894 and based upon the one specimen alluded to. The paper of Cockerell gives nothing as to the anatomy of this beautiful creature, a gap which I hope soon to be able to fill. Until this is done little can be said authoritatively as to whether or not this and the 2 other species of *Chromodoris* described by Cockerell are distinct from the 2 California species already described by Bergh (1879, 1894).

#### 10. *Doriopsis fulva* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,286, U. S. National Museum.

Body elongate elliptical, the mantle equally rounded in front and behind, slightly depressed, soft, dorsum with low papilla-like elevations nearly all of which bear a small central white fleck. General body-color a rich yellow, foot and under side of mantle slightly lighter, rhinophores darker, branchial plumes yellowish white; mantle margin wide, thin, crenulate, extending well beyond the foot; anterior edge of foot bilabiate, the upper lip deeply notched; mouth opening very small, pore-like; oral tentacles very small, adnate to under surface of mantle, directed forward.

Length up to 65 mm.; breadth to 30 mm.; height, 12 to 15 mm.

Rhinophores not large, perfoliate with 18 to 20 leaves, retractile into sheaths with smooth thin margins; branchial plumes 5, tripinnate, wide spreading, retractile within a sheath with high flaring margin; oral armature and radula absent as in this genus. Glans penis cylindro-conical, thickly set with strongly curved hooks arranged in quincunx and continued down the cavity of the vas deferens for about .18 mm.

One of the commonest Nudibranchs in Monterey Bay. Abundant in tide-pools during the summer months, less so in the winter but never entirely absent.

It is barely possible that this species is identical with the *Doris albopunctata* of Cooper from Santa Barbara and Santa Catalina Island, the general coloration being similar. Other points in his brief description are, however, decidedly at variance, and in the absence of his original type specimens the identification is very difficult.

#### 11. *Aegires albopunctatus* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,281, U. S. National Museum.

Body arched, not at all depressed, robust, highest and broadest just in

front of the branchial plumes and sloping rapidly into the broad bluntly rounded tail, in front more gradually; dorsum everywhere thickly set in irregular rows with short blunt tubercles, cylindrical or with slightly expanded apices; frontal margin narrow, closely set with tubercles continued behind the rhinophores as a tuberculate ridge diminishing in prominence, the dorso-lateral ridge being posteriorly marked only by an irregular row of tubercles curving upward toward the median line behind the branchiæ and meeting the mid-dorsal row of the tail; foot narrow, linear, the sides nearly parallel, in front truncate, undivided, behind tapering abruptly. Ground-color white or yellowish-white, with irregularly scattered small dark brown spots, or entirely white; dorsum and sides sprinkled everywhere between the tubercles with minute dots of pure white.

Mouth small, inconspicuous, oral tentacles small lobe-like; rhinophores simple, cylindrical, truncate, completely retractile within prominent tubercular sheaths, the margin high on the outer side, low on the inner; between the rhinophores a median longitudinal row of tubercles; branchial plumes 3, small, tripinnate, each one protected by a large irregularly tuberculate lobe on its outer side.

Length of large individual 13 mm.; width, 3.5 mm.; height, 4 mm.

In the roof of the mouth a broad thick quadrangular mandibular plate, the anterior edge thick and straight, the posterior thin and rounded; a narrow girdle of fine rod-like cuticular thickenings guarding the opening; radula broad, deeply grooved; teeth in 16 to 22 rows of 17 teeth each; rhachis narrow, naked, pleural teeth 17, similar in form, strongly hooked, the shaft with the usual thin wing-like process on the inner margin. Glans penis and canal of vas deferens clothed with very minute, densely-set hooks.

Found under overhanging rocks between tide marks. Very sluggish in movement, avoids the light and soon dies in captivity.

#### **Laila** gen. nov.

Body depressed; frontal and lateral margins narrow, set with club-shaped papillæ; rhinophores retractile; clavus perfoliate; branchial plumes few, tripinnate, non-retractile into sheath, tentacles blunt, canaliculate; a flattened sub-marginal ridge on each side of anterior end of body just behind and above the tentacles; no labial armature nor mandibles; radula not narrow, the rhachis with a single series of flattened spurious teeth; first pleural tooth slender, hook-like, the second large, the remainder smaller, flattened. Glans penis armed.

This new genus is proposed for the reception of the following described form as its type. It is allied to the genera *Triopha* Johnston and *Issa* Bergh, but differs from the first in the character of the frontal appendages and in the presence of spurious teeth upon the radula. From *Issa* it differs in the absence of mandibles, and from both in the presence of the sub-marginal flattened ridge or lobe.

12. *Laila cockerelli* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,290, U. S. National Museum.

Body elongate, depressed, the ends rounded, back slightly convex, mantle margin prominent, overlapping the foot everywhere except behind; mantle margin bearing closely set, stout club-shaped papillæ, 1 to 6 mm. in length, arranged in short oblique rows of 3 or 4 in each, increasing progressively in size from the outermost inward; each papilla supported by an axial column of stout spicules; median portion of dorsum with numerous low scattered tubercles of varying size.

Head wide, sloping above, the frontal margin prominent, bearing papillæ similar to those of the mantle sides, the mouth opening large with conspicuous fleshy plicated lips; beneath the mantle margin on each side of the head a fleshy, flap-like sub-pallial ridge its anterior end just behind and slightly above the base of the oral tentacles; length of ridge, 2 mm., width, 5 mm., its edge smooth, the ends rounded; oral tentacles cylindrical-conical, truncate, the upper surface grooved.

Anterior margin of foot deeply bilabiate; rhinophores perfoliate with about 13 leaves, retractile within smooth margined sheaths; branchial plumes 5, non-retractile into cavity, tripinnate.

General body-color yellowish white, slightly translucent; clavus of rhinophores, processes of mantle margin and tail tipped with deep orange-red, the branchial plumes and median dorsal region occasionally flecked with the same; dorsum marked with an irregular network of transparent lines, the effect of the multitudinous spicules shining through the skin.

Total length of largest specimen, 20 mm.; width, 7 mm.; height, 6 mm.

Radula nearly colorless, broad with wide median groove. Teeth in 76 to 82 rows; rhachis narrow, with a single series of colorless flattened plates; pleural teeth 2, the first one a single slender strongly curved vertical hook fitting closely to the second pleural tooth which is strong and heavy, the shaft irregular in form bearing at the anterior end 2 strongly hooked cusps, the inner one smaller, the 2 together forming a crescentic figure; the lower (posterior) end of the shaft with a slight wing-like elevation on its outer face; uncinial teeth 10 to 13 in number, closely set, pavement-like, presenting from above an arched quadrangular outline, the first 4 with 2 pointed cusps at the posterior angles, much reduced and finally disappearing in the outer ones which become transformed into flattened plates. Glans penis long, cylindrical, armed with 10 to 12 irregular rows of minute thorn-like hooks.

Occurring under shelving rocks between tide marks along the coast. Not rare. Much smaller individuals of the same species have been collected at San Pedro, Calif. by Prof. T. D. A. Cockerell for whom the species is named.

13. *Triopha carpenteri* Stearns.

*Triopa Carpenteri* Stearns. Descriptions of a New Genus and Two New Species of Nudibranchiate Mollusks from the Coast of California, Proc. Calif. Acad. Sci., 1873, 78, fig. 2.

*Triopha Carpenteri* Stearns. Bergh, Nudibranchiate Gasteropod Mollusca of the North Pacific Ocean, with Special Reference to Alaska, II, Proc. Acad. Nat. Sci., Phila., 1880, 113.

*Triopha Carpenteri* Stearns. Bergh, System der Nudibranchiaten Gasteropoden, 1892, 148.

Body limaciform, robust, anteriorly obtusely rounded, posteriorly rather bluntly pointed; head obliquely flattened, lunate with a narrow frontal margin laterally continued into the less conspicuous dorso-lateral ridge and bearing along its whole length a series of irregularly lobed or tuberculate papillæ; scattered upon the minutely granuliferous dorsum many large and small simple or compound tubercles, often tending to form a median series in the anterior part of the dorsum. General body-color white, inclined to yellowish above, often sprinkled with minute white spots borne upon very small tubercles; tips of branchiæ, clavus of rhinophores, appendages of frontal and lateral margins and numerous scattered tubercles of the dorsum a deep orange color; numerous irregular blotches of orange also scattered along the sides of the animal in no regular arrangement; region of body beneath the gill-plumes darker, caused by the deep brown liver shining through the skin.

Rhinophores perfoliate, with 20 to 30 leaves, retractile into prominent sheaths, the margins of which are thin, smooth or slightly wavy in outline; Branchiæ 5, large, tri-pinnate, spreading non-retractile into sheaths; tentacles short, stout, auriform, their outer borders with a longitudinal groove; oral armature a triangular brownish-yellow mandibular plate on either side made up of closely set slightly curved blunt rods; radula broad, deeply grooved, dark amber in color; teeth in 33 rows; rhachis broad with four rows of flattened plates (spurious teeth); of these the inner 2 rows are quadrangular, the outer rows more triangular in form, the rounded and slightly thickened anterior margin being narrower than the posterior one, the outer margin prolonged backward, especially in the posterior part of the radula; pleural teeth yellow, strongly hooked, of nearly uniform shape and size, the number varying in different individuals from 9 to 18; base of each hook with a wing-like process; uncini quadrilateral in general outline, varying from 9 to 18 in number in different individuals, with a conspicuous longitudinal crest decreasing in size toward the outer uncini and disappearing entirely in the outermost ones. Glans penis armed with minute thickly set hooks.

Length of large individual, 60 mm.; greatest height, 29 mm.; greatest width, 15 mm. Maximum height of dorso-lateral processes, 3 mm.

Found on brown kelp of the fucoid zone and in rocky tide-pools everywhere along the coast of Monterey Bay. The commonest Nudibranch of the region and one of the most conspicuous.

The fragmentary description of Stearns (1873) is based entirely upon external features but is amply sufficient to render certain the identification of living specimens, especially as they are taken from the same locality as that from which Stearns secured his original specimens. The structure of the radula shows that it is distinct from *T. modesta* Bergh, with which it has been united by the latter author in his paper upon Alaskan Nudi-branches.

No. 181,291, U. S. National Museum. Monterey Bay, Calif.

#### 14. *Triopha maculata* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,276, U. S. National Museum.

Body limaciform, the back passing insensibly into the sides save for the line of processes which indicate the boundary. Sides slightly compressed, foot linear, bluntly rounded in front, less so behind; head flattened, sloping to the wide semicircular frontal margin which bears a fringe of from 10 to 12 short stout processes, each branching at its distal end into several blunt or knob-like divisions each of which may be branched in turn; dorso-lateral margin with a similar series of 4 to 6 short branched processes continuous forward into the frontal marginal series; tail rapidly sloping from branchial region, highly arched; color of dorsum and sides yellowish brown, varying from light to dark, thickly set everywhere with small bluish white oval spots each forming the center of a very low polygonal eminence bounded by very narrow orange yellow lines upon the dark brown background; foot below orange-yellow shading off above on the sides into the deeper brown of the dorsum; frontal and dorso-lateral processes and tips of branchiæ, margin of rhinophore sheaths and clavus bright orange-red or vermilion; oral tentacles auriform, deeply grooved on upper side, truncate; rhinophores stout, perfoliate with about 18 leaves, retractile into high sheaths with smooth or slightly crenulate margins; branchiæ 5, tripinnate, low, wide spreading; mandibular plates dark yellow, triangular, made up of short flexible blunt rodlets; radula broad, deeply grooved, light yellow; teeth in 14 rows; rachis broad with 4 series of flattened plates, the 2 innermost rows being quadrangular in shape, the anterior margin smooth, thickened, the 2 outer rows flattened, triangular, the central region more or less thickened and the lower inner angle occasionally prolonged into a slight cusp; pleuræ 4 or 5, large, strongly hooked, of nearly the same size and shape; uncini 7 or 8, the first ones slightly prismatic in form gradually becoming reduced to flattened plates; a well developed slightly oblique crest directed toward the median line is borne by all except the outermost two or three uncini. Glaus penis armed with thickly set hooks.

Measurements of the longest specimen taken: length, 22 mm.; width, 10 mm.; extreme height, 11 mm.

Abundant in tide-pools all along the coast of Monterey Bay.

15. *Triopha grandis* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,283, U. S. National Museum.

Body large, not depressed nor compressed, plump, sloping rapidly backward from heart region to tip of short blunt tail, more gently forward; head flattened above with prominent semicircular frontal margin bearing 10 to 12 tuberculate or branched processes; dorso-lateral margin with 4 to 6 similar processes; dorsum arched, smooth, of a yellowish brown color flecked everywhere with bluish spots or entirely plain, the tips of the processes of frontal and dorso-lateral margins, tips of branchiæ and tip of tail yellowish-red; foot linear, rounded in front, tapering to blunt tail behind; tentacles blunt, auriform, 3 mm. long; rhinophores rather large, perfoliate with about 20 leaves, retractile within conspicuous smooth-margined sheaths; branchia 5, tri- and quadripinnate, wide spreading.

Length of largest specimen: 80 mm.; width, 25 mm.; height, 30 mm.

Mandibles elongate triangular, light yellow, much reduced in size, made up of short slender slightly curved rodlets; radula broad, deeply grooved, the teeth deep amber in color; rachis broad with 4 series of flattened plates, the 2 median rows nearly equilaterally rectangular, thickened transversely in anterior half into a cutting ridge from which a fainter longitudinal ridge extends toward the anterior margin, the plates of the 2 outer series triangular and bearing a heavy blunt cusp sloping gradually forward on inner posterior portion; pleuræ 7 or 8 in number, strongly hooked of nearly equal size, with small wing on basal portion of shaft; uncini 8, prismatic, flattened, the inner 4 of nearly the same size, the outer 4 rapidly decreasing, the outermost being nearly rudimentary, each bearing a low longitudinal wing-like crest projecting toward the median line. Hermaproditic duct very long, together with its slightly larger ampulla measuring about 60 mm. in an average specimen; the spermatic duct passes into the large, flattened prostate gland almost at its origin and beyond this gland dilates into the long, cylindro-conical ampulla, 5 mm. in length by 2 mm. extreme diameter at proximal end; glans penis and distal end of vas deferens lined with closely-set minute hooks; spermatheca very large, 10 mm. in diameter, spermatocyst elongate, pear-shaped.

This species has been taken only upon the brown kelps, *Nereocystis* and *Macrocystis*, at some distance from shore. It has never been taken in tide-pool collecting where the 2 above described species are common.

16. *Polycera atra* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,278, U. S. National Museum.

Body limaciform, smooth, plump, highest in cardiac region; head rather high, sloping in front, expanded into a moderately wide horseshoe-shaped frontal margin bearing 4 long slender processes; at the sides below the rhinophores this frontal veil is slightly dilated and bears 1 or 2 short pointed, angular processes, laterally it is continued into a more or less conspicuous dorso-lateral ridge highest in the branchial region where it bears



1 or 2 compressed pointed tubercles; behind the branchiæ the 2 lateral ridges unite in a low median crest to tip of tail; branchiæ 8, simply pinnate, non-retractile, tallest in front, decreasing regularly in size from in front backward; rhinophores stout, without sheaths, perfoliate; oral tentacles very short, lobiform; foot linear, the anterior angles prominent; general ground-color black, the dorsum and sides with numerous longitudinal rows of yellow spots, more or less confluent into continuous lines, the intermediate spaces between the spots of each row greyish, also the basal portion of frontal veil and the foot of same color; mandibles light yellow, very strong, each divided into a ventro-anterior cutting portion and a dorso-lateral arched wing; radula amber to dark brown in color, rather deeply grooved; teeth in 9 or 10 rows, the half rows not in a straight transverse line; rhachis naked; pleuræ 2, unequal, the first smaller than the second, alike in form, the shaft stout, flattened slightly, bearing a broad triangular wing directed toward the median line; the hook broad, large, bent toward median line; length of first tooth, 3 mm., the second .412 mm.; uncini 3, prismatic, triangular in section decreasing in size from within outward; rarely a fourth rudimentary uncinus may be present. Glans penis closely set with minute hooks arranged in rows.

Length of animal, up to 23 mm.; width to 6 mm.; greatest height, 7 mm.

Found on red algæ (*Gigartina*) in rocky tide-pools all along the southern coast of Monterey Bay; abundant.

#### 17. *Acanthodoris hudsoni* sp. nov.

*Type* from Point Pinos, Calif. No. 181,289, U. S. National Museum.

Body plump, highly arched, slightly higher and broader in front than behind, oval; dorsum soft villous, the papillæ short, thickly set, bluntly conical; mantle margin broad, thick; general ground-color clear translucent yellowish-white or pinkish, the papillæ and branchiæ tipped with lemon-yellow, the mantle edged with the same color; head wide, the oral tentacles broad triangular, a wide median anterior notch between them; foot broad, rounded abruptly in front, much less so behind; rhinophores long, tapering, clavus recurved; perfoliate with about 24 leaves, the length of stalk and clavus nearly the same, retractile into low sheath with papillose margin; branchiæ 5, bipinnate, without sheath, widespreading; pharyngeal crop large, hemispherical, very thick-walled; labial aperture a pavement of minute hooks upon the lower and lateral walls of opening; lowermost portion free from hooks and bearing a broad slightly concave cuticular plate, pointed behind, and forked anteriorly into 2 blade-like processes which project beyond the margin of the opening, its total length being about .288 mm.

Radula very narrow, deeply grooved; teeth in 27 rows; rhachis very narrow, naked; first pleural tooth very large, upright, compressed, its base quadrangular in outline, the posterior border thin and wing-like, overlapping the succeeding tooth; anterior lower margin very strongly thickened, rounded; the upper anterior margin of the base prolonged upward into a strong nearly straight hook, the upper inner margin of which bears a

series of 5 to 7 denticles decreasing in size from above downward; in the most anterior teeth of the radula the denticles occasionally number 10 or 11, the lowermost 4 or 5 being extremely small. The remaining 5 or 6 pleuræ are small and of nearly the same size, obliquely placed, upper margin prolonged into a slightly compressed blunt hook with a thin keel-like plate extending from its posterior median line to base, general shape being somewhat similar to first plural tooth. Total length of average first pleural tooth .370 mm., of the remaining pleuræ .05 mm. Glans penis armed with very minute hooks.

Taken in tide-pools at extreme low water near Point Pinos, the southernmost point of Monterey Bay; rare.

Species named in recognition of the able work of my friend Capt. Chas. B. Hudson, Artist of the U. S. Bureau of Fisheries.

### 18. *Acanthodoris brunnea* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,293, U. S. National Museum.

Body outline oval, convex, broadest in front in region of rhinophores; mantle thickly set everywhere with blunt conical tubercles, its mantle broad and thick.

General color of dorsum brown, flecked with irregular blotches of black; between the tubercles numerous small spots of light lemon-yellow, the mantle edged with same color; tips of branchiæ lemon-yellow; rhinophores deep, blue-black, tipped with yellowish white; ventral surface yellow sprinkled with fine black dots.

Total length, 19 to 22 mm., width, 9 to 15 mm.; height, 7 to 9 mm.

Head broad, continued laterally into the wide flat oral tentacles; foot oval, nearly quadrangular, both ends bluntly rounded; rhinophores long, cylindro-conical inclined outward and forward, perfoliate with 20 to 28 leaves, the lower ones in front only, retractile into low sheaths with lobed margins; branchiæ 7, wide-spreading, bipinnate, without sheath; pharyngeal crop large, spherical, constricted longitudinally into 2 symmetrical sides; labial armature an incomplete band of mosaic-like hooks incomplete above; at the lower margin of the armature a single flattened slightly concave longitudinal plate, its margin blunt and freely projecting in front, extending across the whole labial armature; radula narrow, the teeth in 24 to 28 rows, light yellow; rhachis very narrow, naked; first pleural tooth similar in form to that of the preceding species but decidedly smaller being but .342 mm. in total length; upon its upper posterior border a squarish thickened shoulder directed obliquely upward; inner border of the hook with a series of 14 to 19 denticles; remaining 6 or 7 pleuræ small, obliquely placed and decreasing regularly in size from within outward; the first ones of these outer plates bear a flattened thickened dorsal border with a thin keel-like expansion below, the outer ones reduced to mere flattened plates. Glans penis armed with minute hooks.

Dredged off hard sandy bottom in about 10 to 20 metres depth near Monterey; rather rare.

19. *Ancula pacifica* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,280, U. S. National Museum.

Body slightly compressed, smooth, limaciform, highest in front of branchiæ, tapering behind to tip of the long pointed tail, in front sloping less rapidly to the high rounded head. General ground-color clear translucent yellowish-white, a narrow median orange line on dorsum from between rhinophores to tip of tail, interrupted by the branchiæ; upon the indistinctly marked dorso-lateral margins a similar line extending from rhinophores backward, interrupted by the extra-branchial appendages and prolonged for a very short distance beyond the last one.

Head bluntly rounded, the tentacles slender, short and blunt; Rhinophores without sheaths, large, perfoliate, with 9 leaves. At the base of the rhinophore two long slender finger-like processes, tipped with orange, extending obliquely forward and outward, nearly as long as the whole rhinophore; branchiæ 3, bipinnate, in part tripinnate, without sheaths, tipped with orange; on each side of the branchiæ on the dorso-lateral margin are borne 4 blunt club-shaped processes dilated above, their distal third light yellow.

Length of largest individual taken, 16 mm.; width, 2 mm.; height, 3.5 mm.

Pharyngeal crop spherical, prominent, connate; labial armature strong, of flattened blunt minutely serrulate hooks; radula narrow, colorless, the teeth in 35 rows increasing in size from front to back, the posterior teeth being twice the size of the anterior ones; rhachis narrow, with a single series of flattened quadrangular plates; these plates absent in the first 8 to 10 rows but constant in the remaining portion; pleural teeth 2, the innermost large with irregular base and concave triangular vertical body placed slightly obliquely to the median line; its inner margin thickened and bearing 11 to 17 sharp recurved denticles, and terminating above in a strong hook; the outer pleural tooth triangular, thin below and thicker above, terminating in a strong apical hook. Glans penis with about 15 rows of extremely small hooks.

Found on hydroids and bryozoa in tide-pools along southern shore of Monterey Bay; rare.

**Hopkinsia** gen. nov.

Form of body elongate-oval, very much depressed; the dorsum thickly set with long papillæ—simple or occasionally forked; pallial margin not set off from the sides of the body but sloping gradually down into the foot without any distinct boundary, anteriorly continued into a broad velar expansion formed by the fusion of the labial tentacles in front; rhinophores non-retractile, perfoliate; branchiæ several, separate, simply pinnate plumes arranged in a horseshoe-shaped arc; the foot broad, its margin thin, undulating, in front deeply emarginate, behind forming a short broad blunt tail; head broad, its tentacles very broad and thin, auriculate at the

outer posterior angles, in front united into a veil with undulating margin; labial armature a ring of very short thickened rods; radula very narrow, the rhachis naked; the first pleural tooth long, erect, hooked, the outer one flattened, horizontal, denticulate. Glans penis armed.

This new genus is dedicated to Mr. Timothy Hopkins, through whose generous interest in Biology the foundation of the Hopkins Seaside Laboratory was rendered possible. Its type is the following new species.

#### 20. *Hopkinsia rosacea* sp. nov.

*Type* from Monterey Bay, Calif. No. 181,275, U. S. National Museum.

General body outline elongate-elliptical, the ends abruptly rounded; mantle firm, densely spiculate, much depressed, sloping gradually outward to the thin margin of the foot, no mantle margin being present; foot broad, abruptly rounded behind, in front with a broad triangular notch with slightly thickened margin, the remaining margins thin and undulating; head broad, the oral tentacles very broad and united in front forming a thin velar expansion with undulating margin, the rounded posterior angles slightly auriculate; dorsum thickly set everywhere with long gently tapering cylindrical soft papulæ, the tips pointed or occasionally branched, many one-half to two-thirds the length of the whole animal; rhinophores perfoliate, cylindro-conical, without sheaths, perfoliate with about 20 leaves, the clavus making up three-fourths of whole rhinophore; branchiæ 7 to 14, erect, simply pinnate, separate, arranged in a semi-circle or horseshoe-form, the ends directed backward; reproductive openings inconspicuous, on right side opposite rhinophores just below the outermost row of papillæ.

Color everywhere a beautiful deep rose pink.

Length of large individual, 29 mm.; width, 16 mm.; height of body alone, 5 mm.; length of longest dorsal papillæ, 18 mm.

Pharyngeal crop strong, ellipsoidal, attached by a very short narrow petiole; labial armature a ring of short thick rodlets in tessellated arrangement, width of armature, .4 mm; radula narrow, the teeth in 16 rows; rhachis very narrow, naked; pleural teeth single erect, long, flattened, the base triangular, broad forming about one-third of whole length, the shaft flattened blade-like, at the distal end a small blunt hook, total length, .63 mm.; the single uncinial tooth is much smaller, thin, depressed, triangular, nearly horizontal, the posterior margin more or less pointed and irregularly denticulate, length, .08 or .09 mm.; greatest width, .076 mm. Prostate gland very large, forming one-half of whole bulk of anterior genital mass; glans penis armed with minute hooks.

Occurring under shelving rocks between tide-marks all along the coast from Monterey to Point Lobos; not rare.

*Stanford University, California.*